

# **Small-scale Crater Counts of MER Landing Sites**

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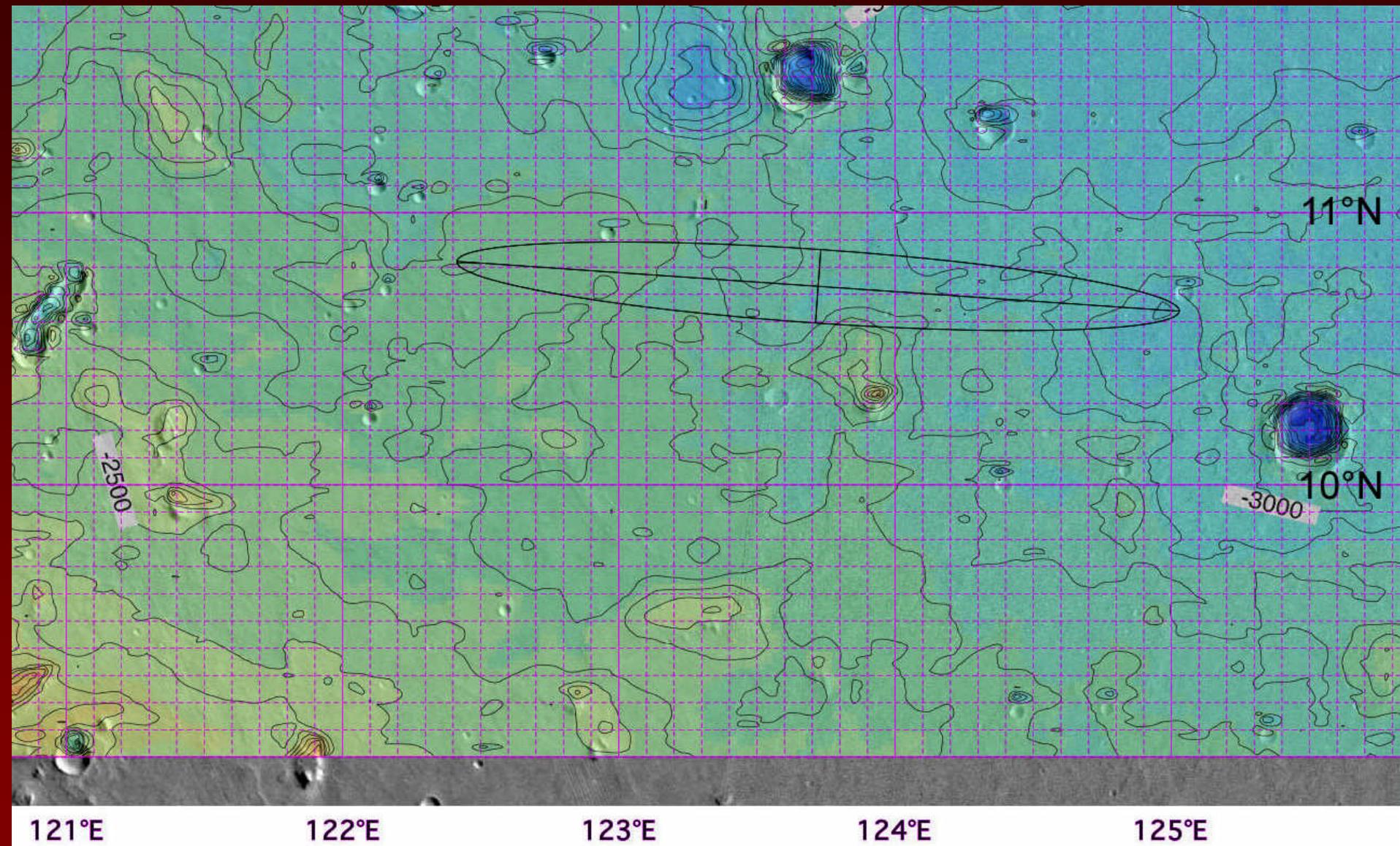
USGS, Flagstaff

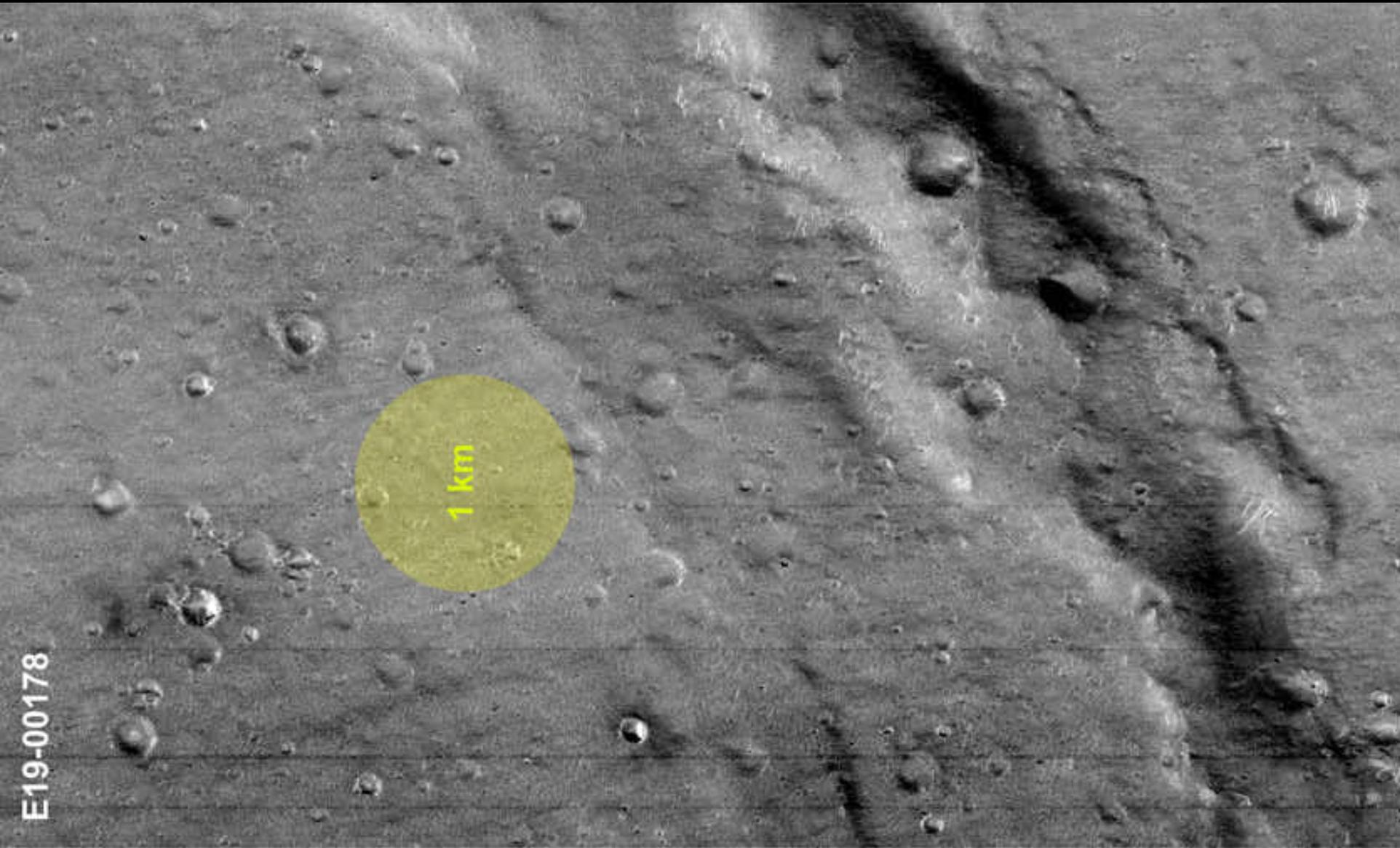
# Rationale

- Crater counts from MOC images yield information about km -scale resurfacing events not represented by larger craters.
- These counts may reflect ages of materials **accessible** to the MER rovers.

**If it's not accessible, it doesn't matter!**

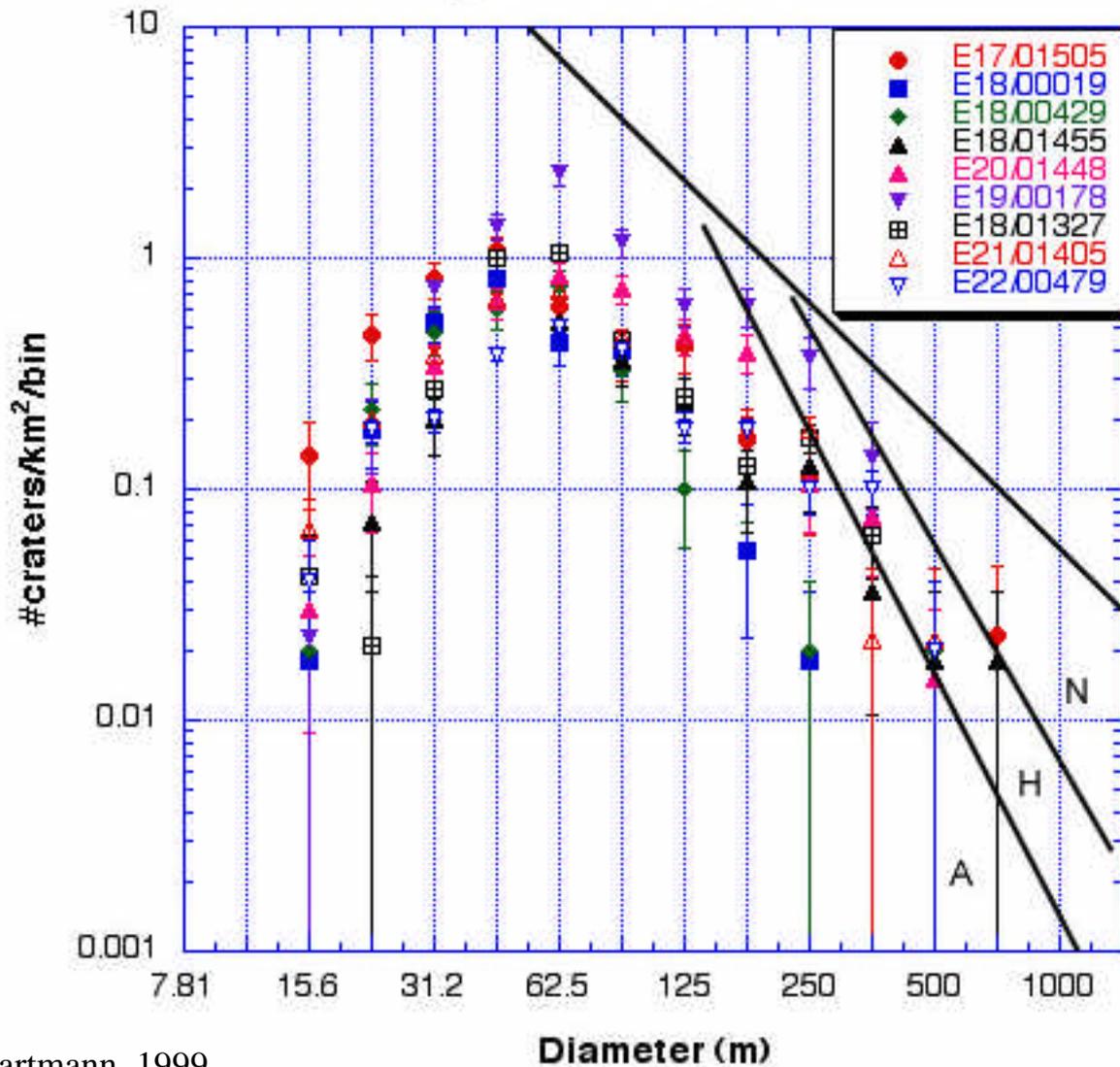
# Elysium Wind Safe Site



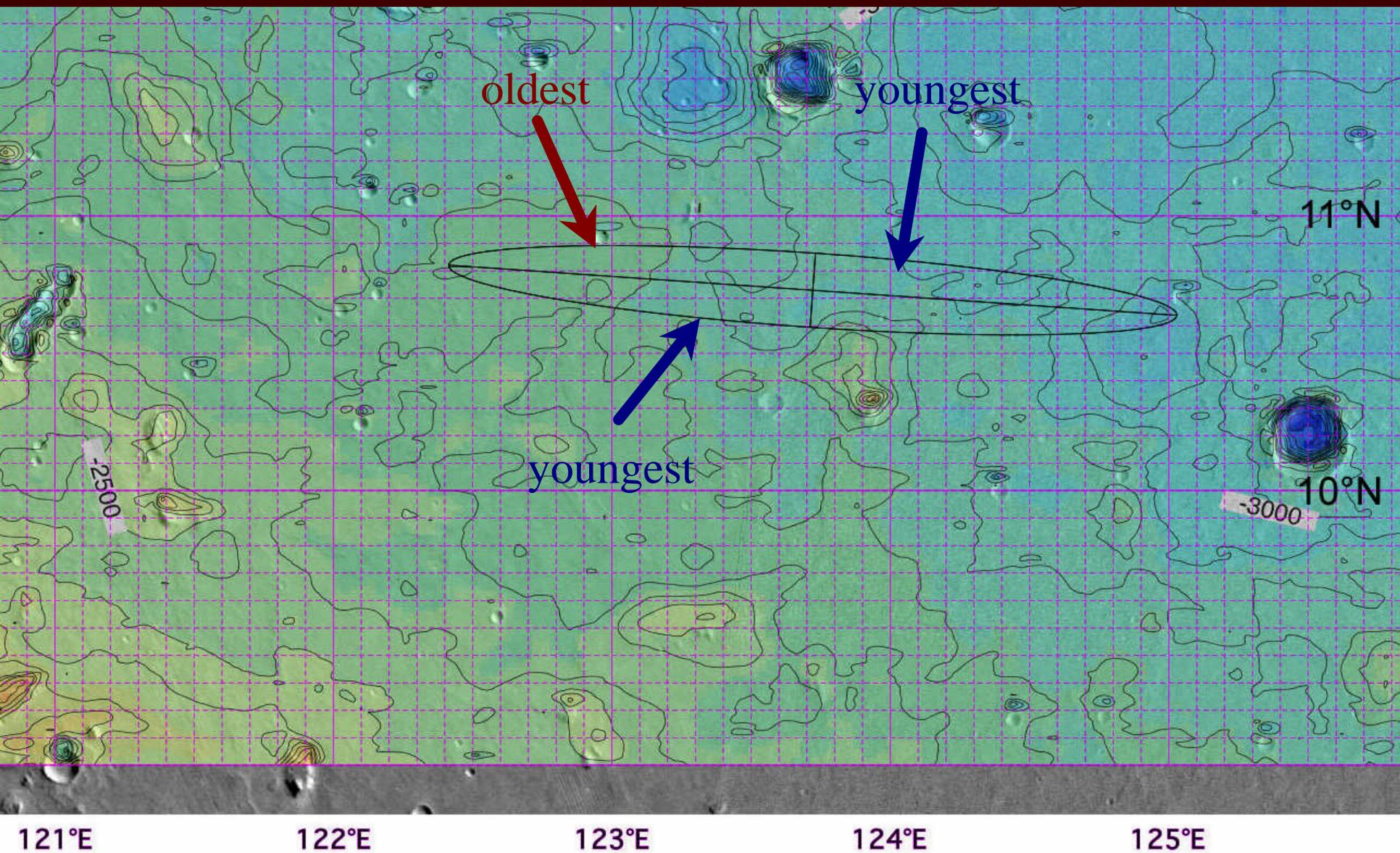


Elysium western portion of ellipse (highest crater density)

### Elysium Wind Safe Site



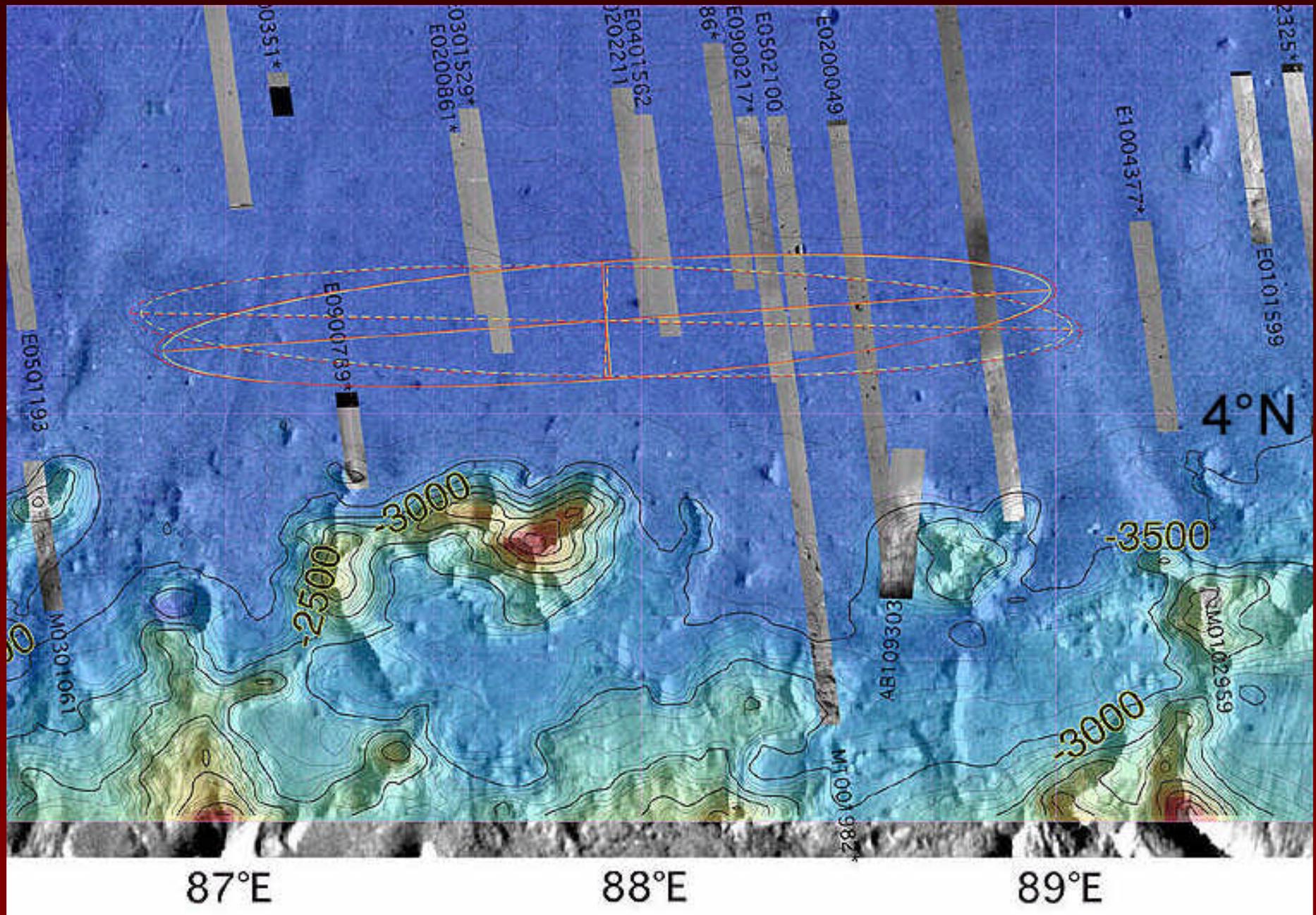
# Elysium Wind Safe Site



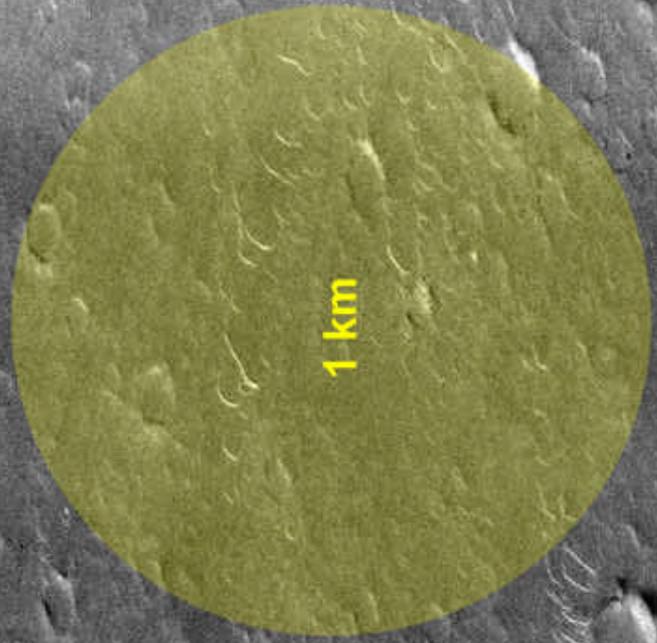
# Elysium Wind Safe Site

- Interpreted to be highlands colluvium.
- Some LN/EH terrain in west perhaps preserved on topographic highs.
- Amazonian resurfacing due to mud volcanism?
- Ridges in every image

# Isidis Site



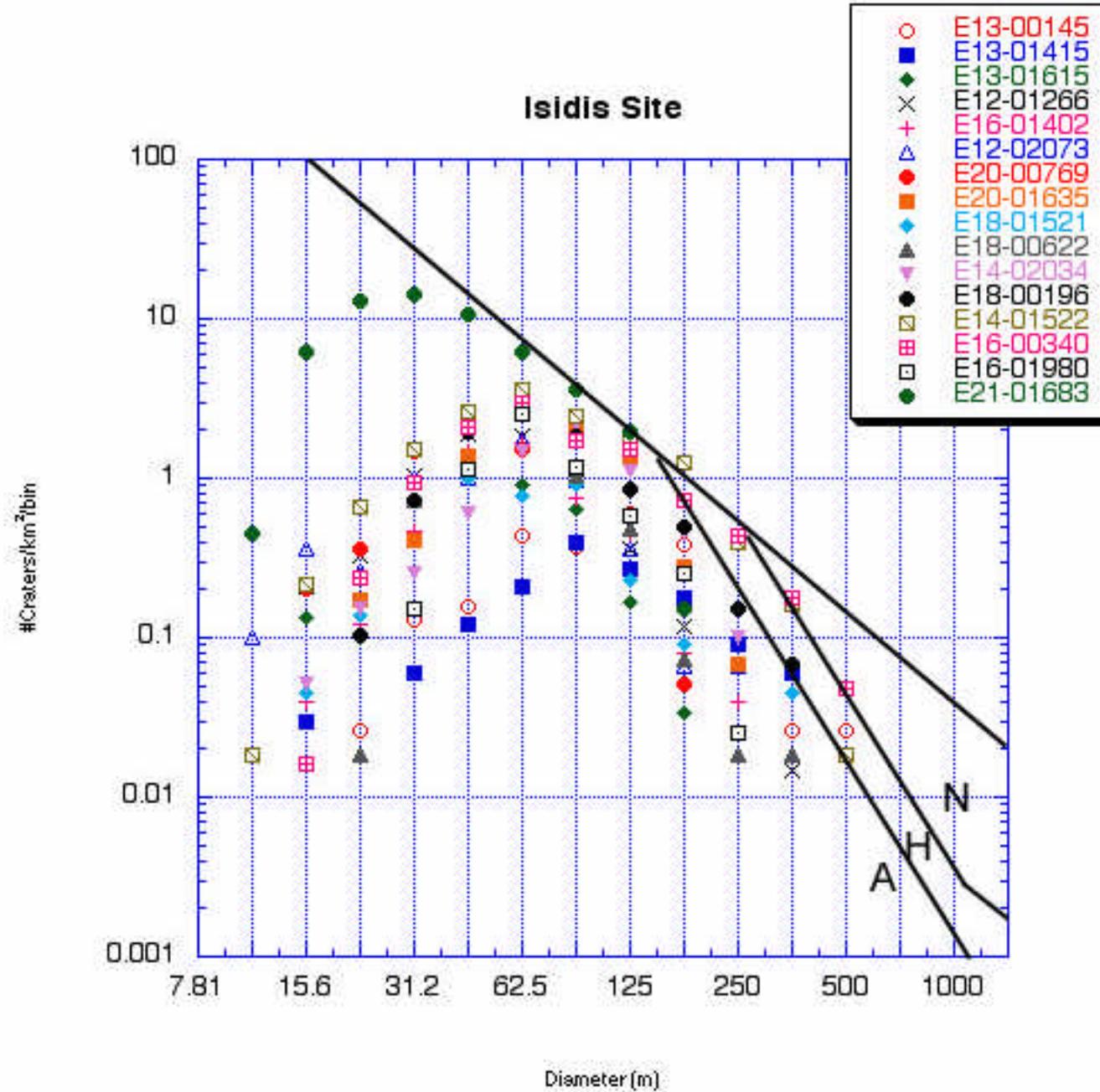
E18-01521



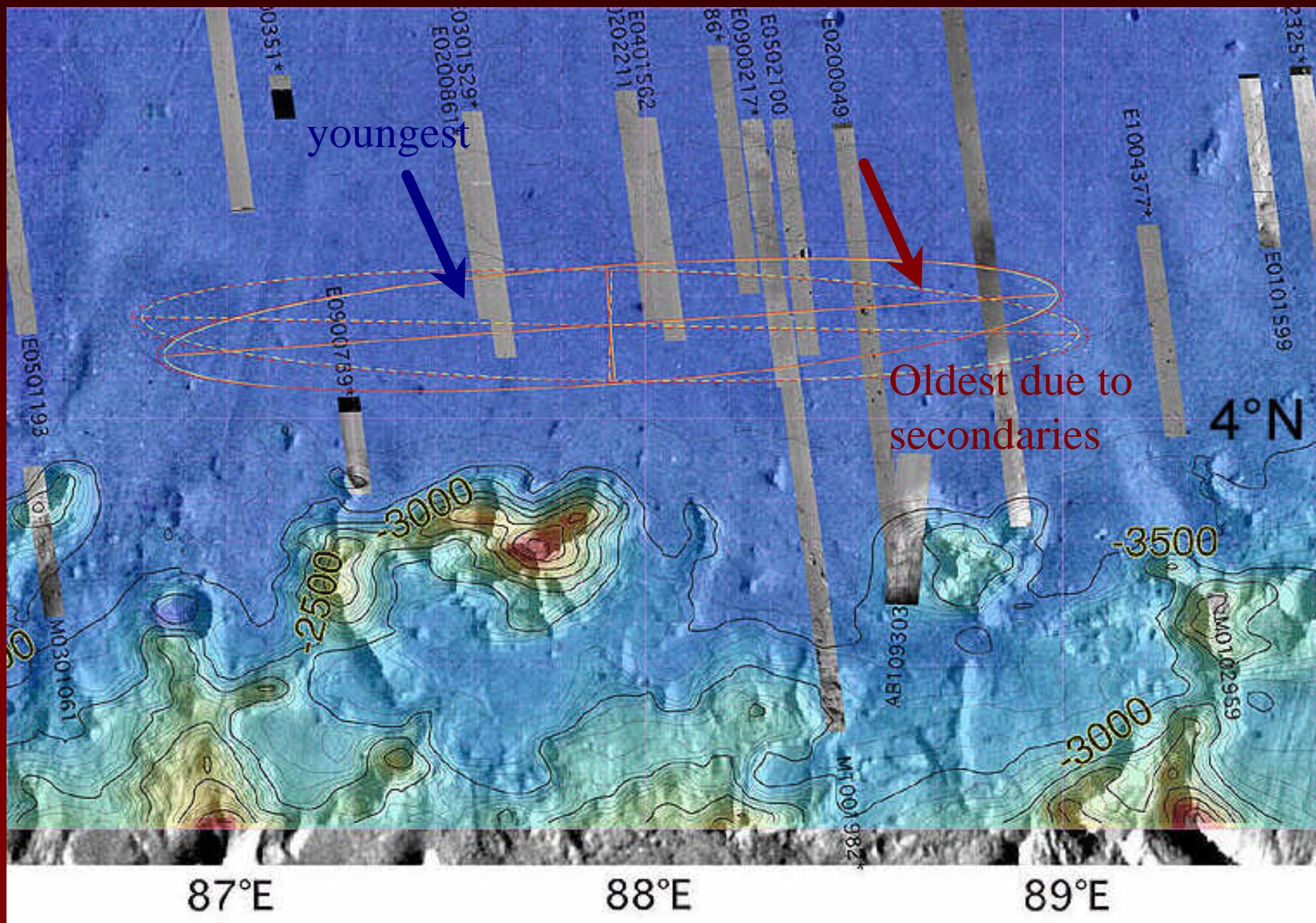
1 km

Isidis Center of Ellipse

# Isidis Site



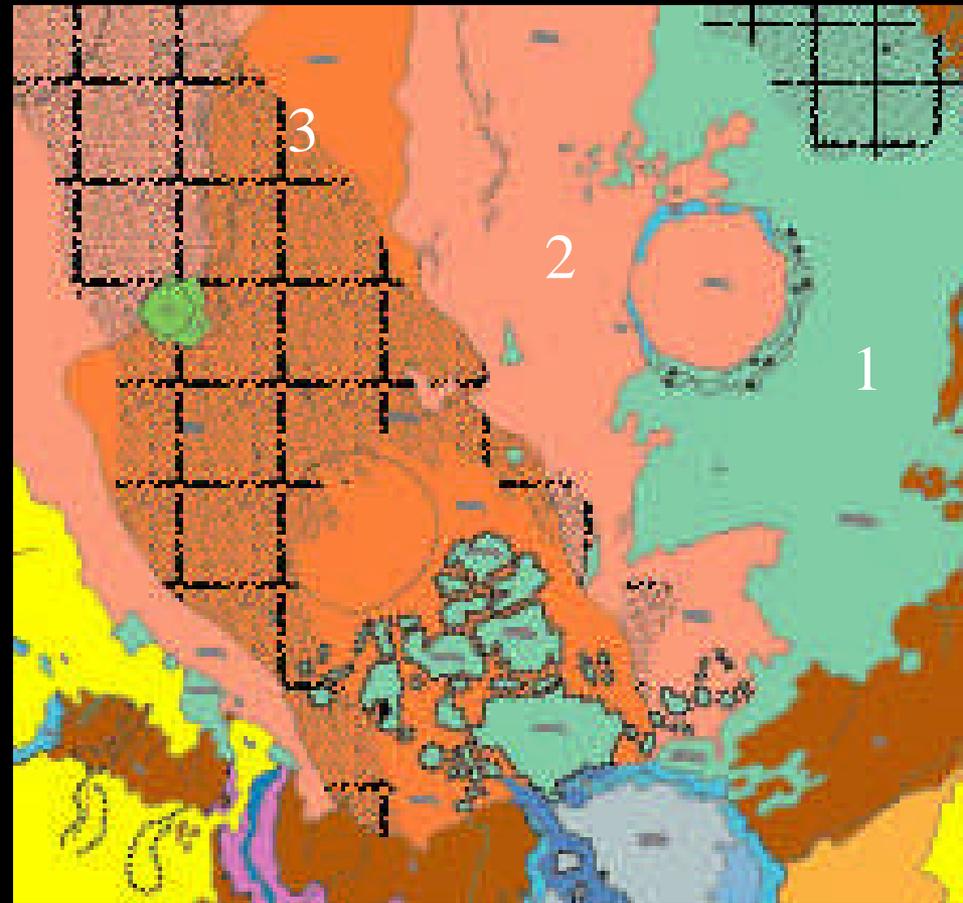
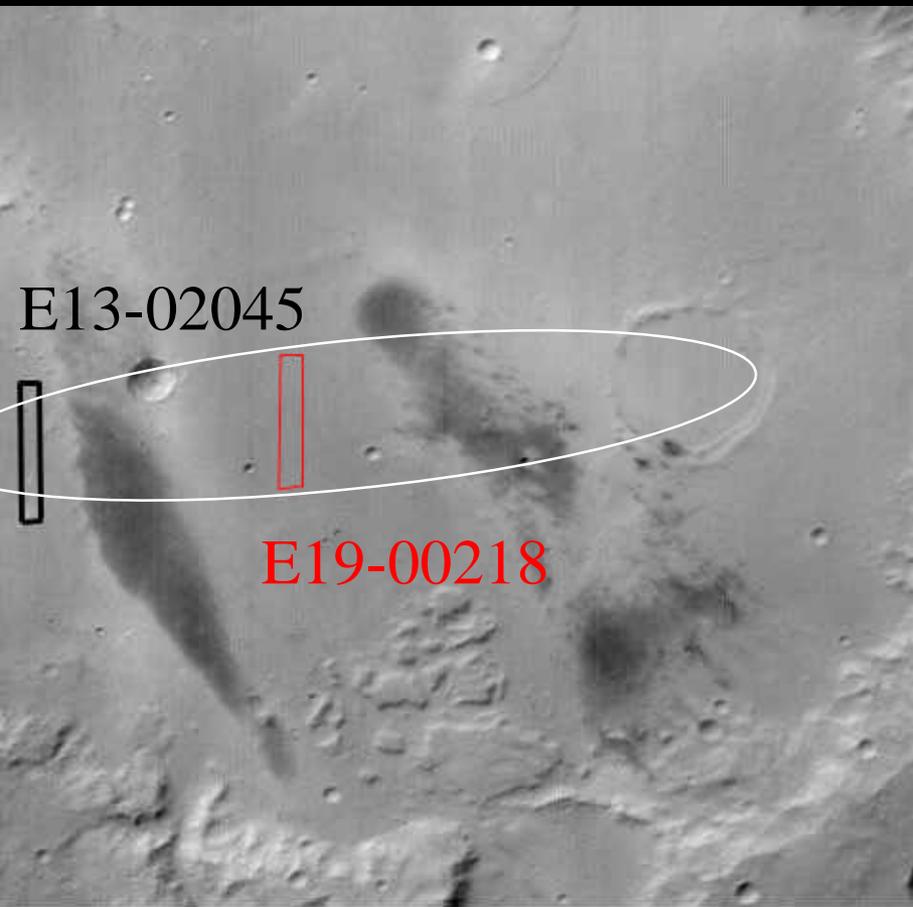
# Isidis Site



# Isidis Planitia

- LH/EA materials
- Area of Amazonian age near center of ellipse.
- Mass wasting of highland materials?
- Highland channel deposits in ellipse?





Kuzmin et al., 2000

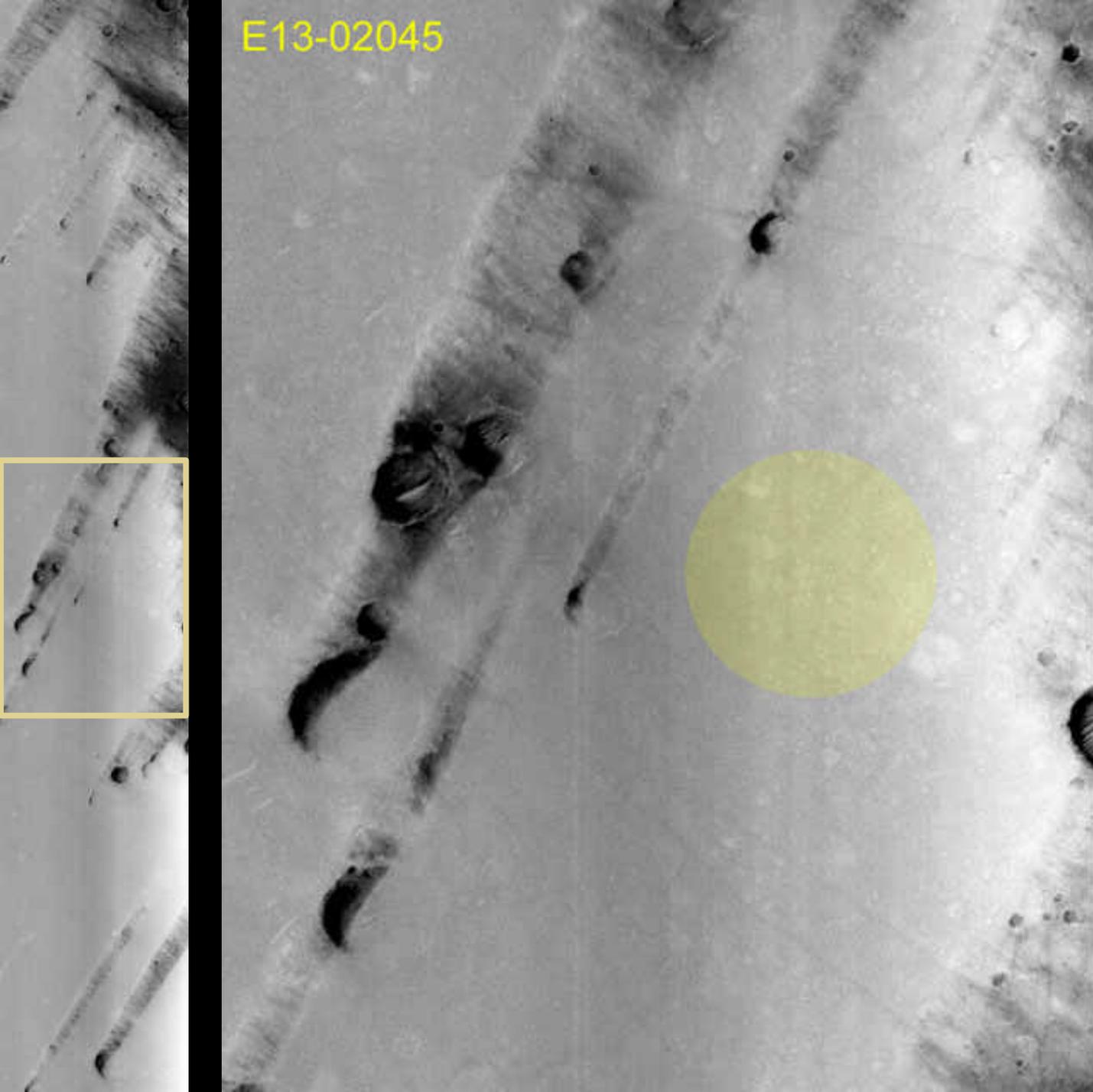
E19-00218



Gusev Crater  
Near center of  
Ellipse

Unit AHgf<sub>2</sub> of  
Kuzmin et al., 2000:  
Fluviolacustrine  
Sediments

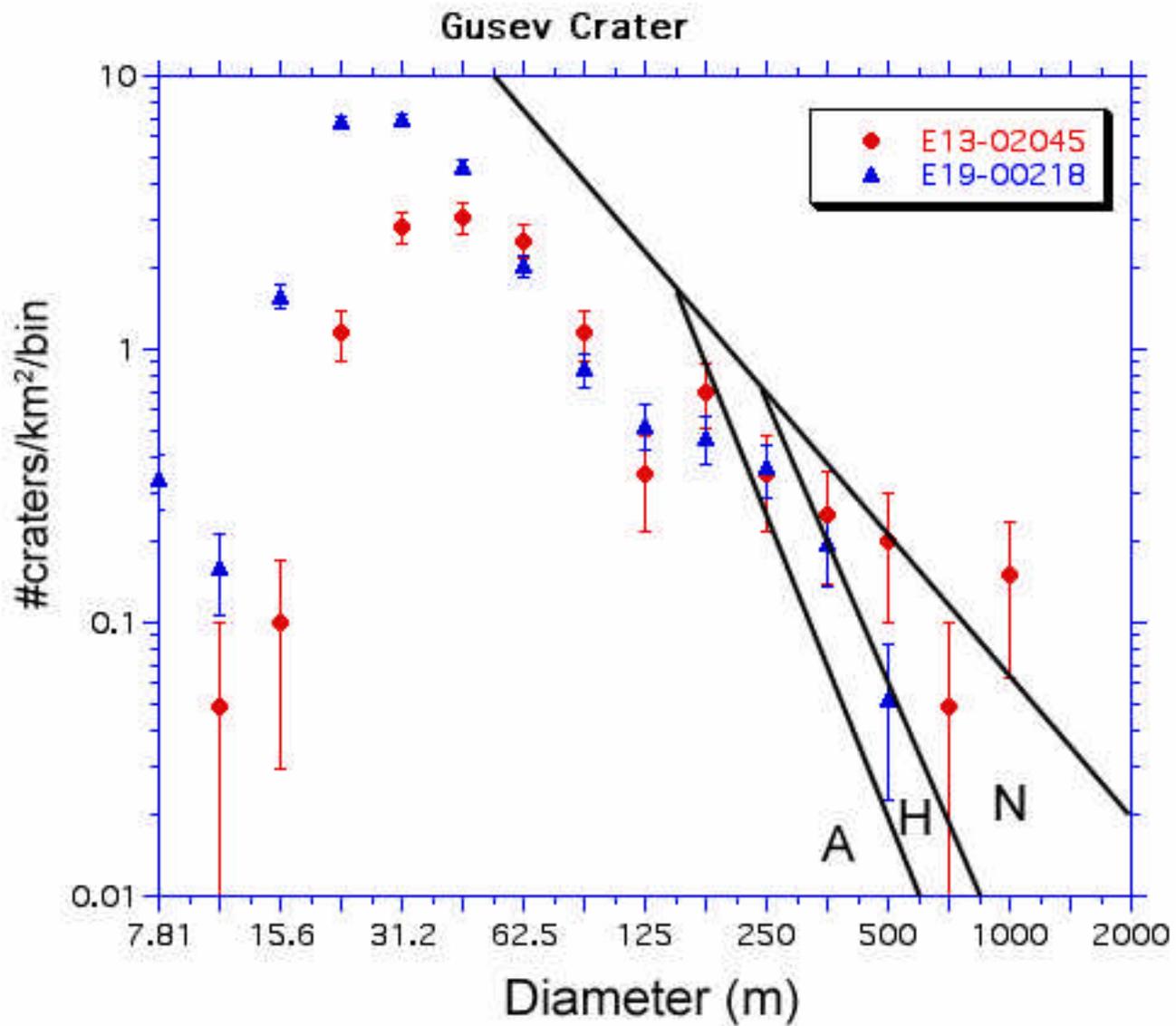
E13-02045



Gusev Crater  
Western Ellipse

Unit AHgf<sub>2</sub> and/or  
AHgf<sub>1</sub> of  
Kuzmin et al., 2000:  
Fluviolacustrine  
Sediments

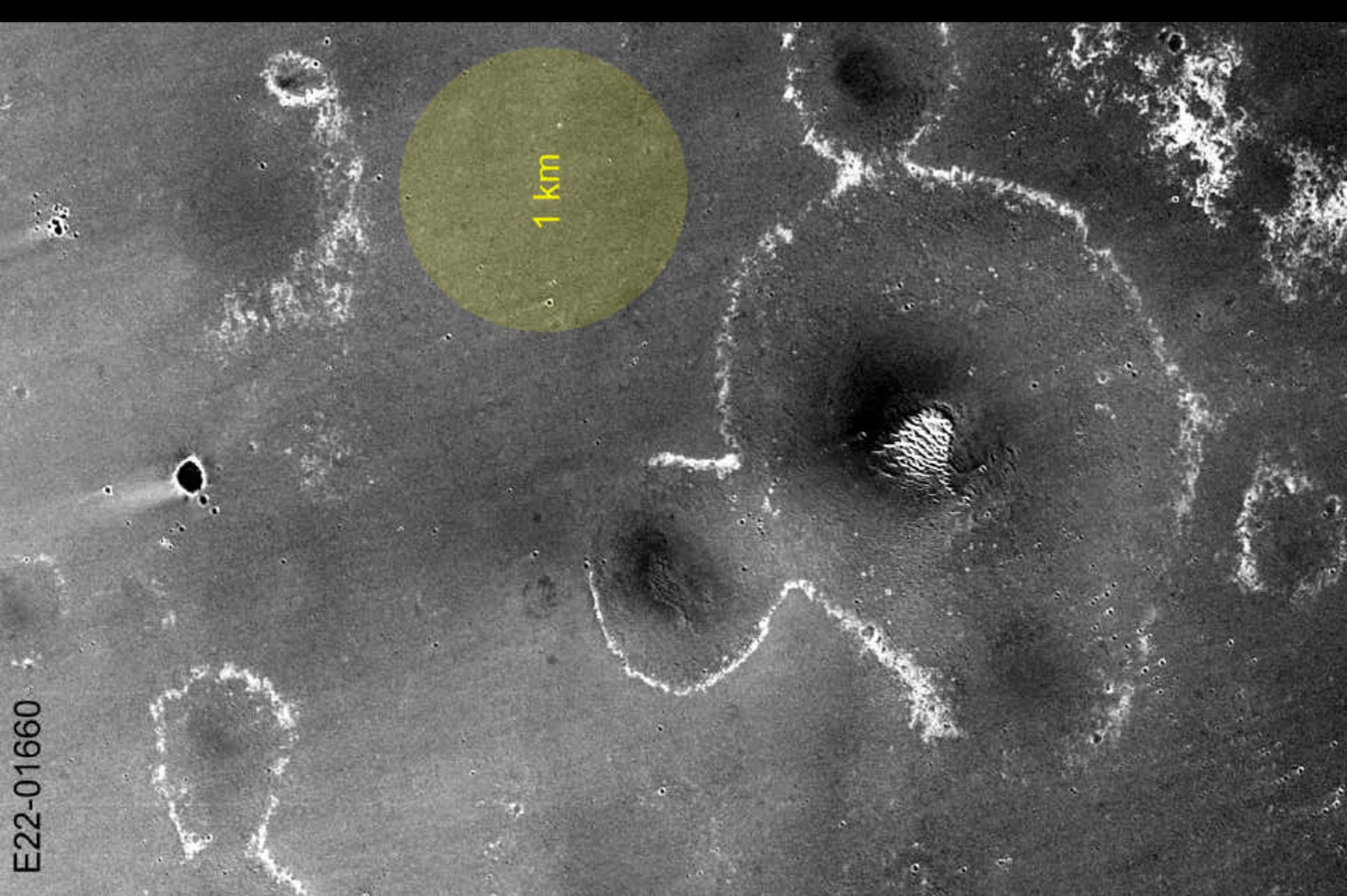
Bright material-  
No fresh craters



# Gusev Crater

- Very young aeolian surfaces; dust devils
- Multi-layered materials
- Exposed Noachian-age materials near center of ellipse overlain by Amazonian-age craters
- Exhumation of Noachian materials in the Amazonian?

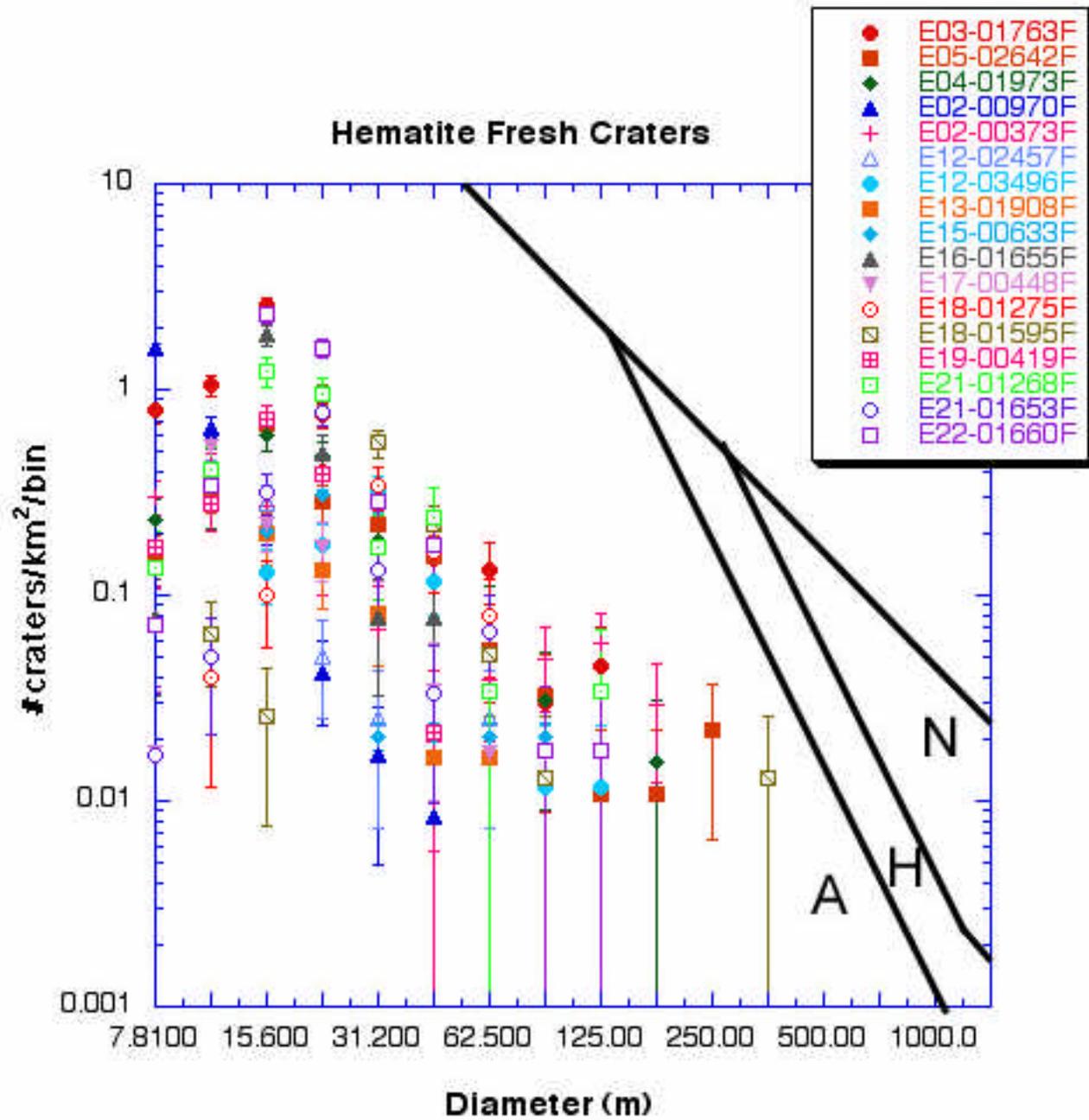




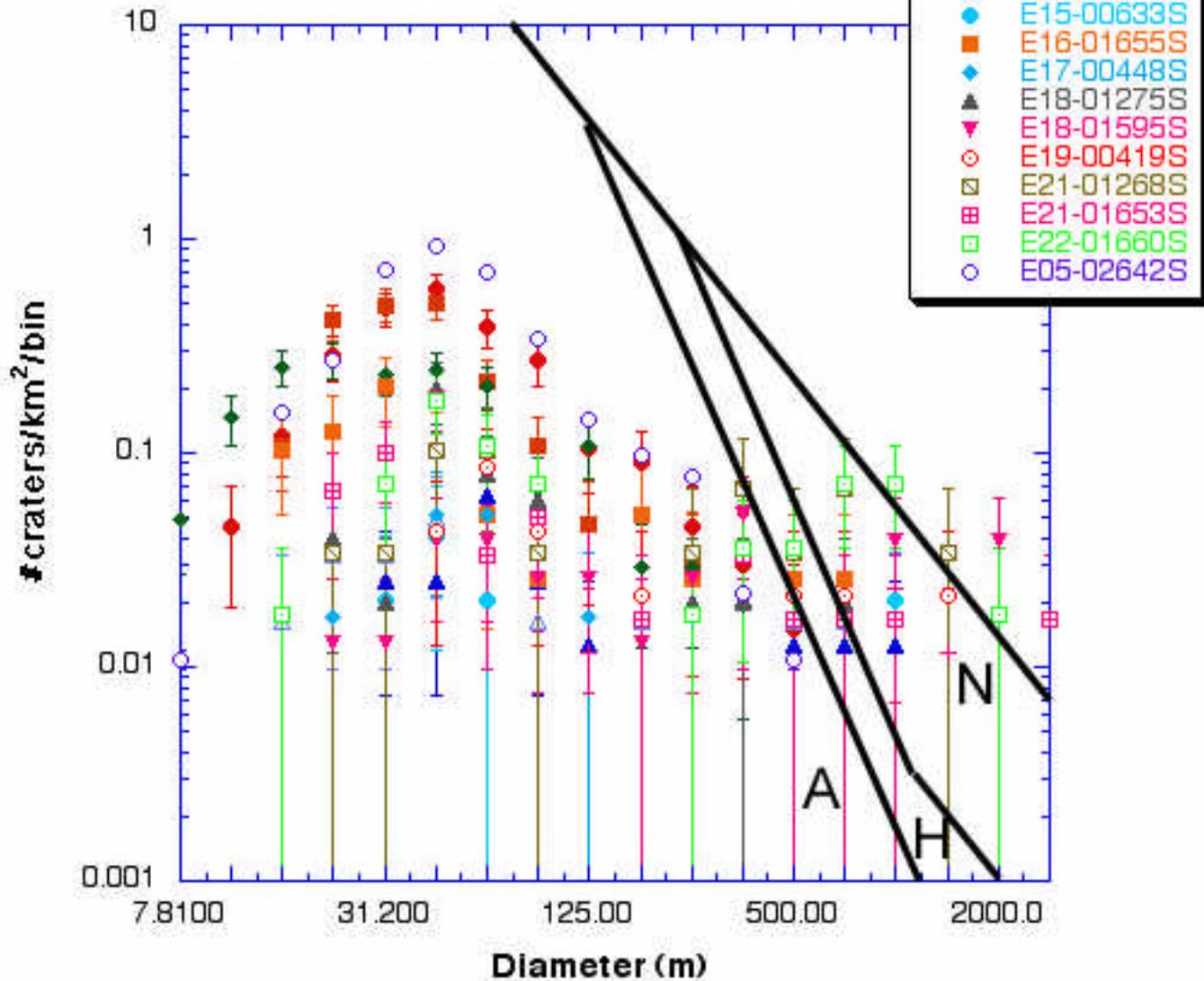
1 km

E22-01660

**Hematite Site** (center of the ellipse)



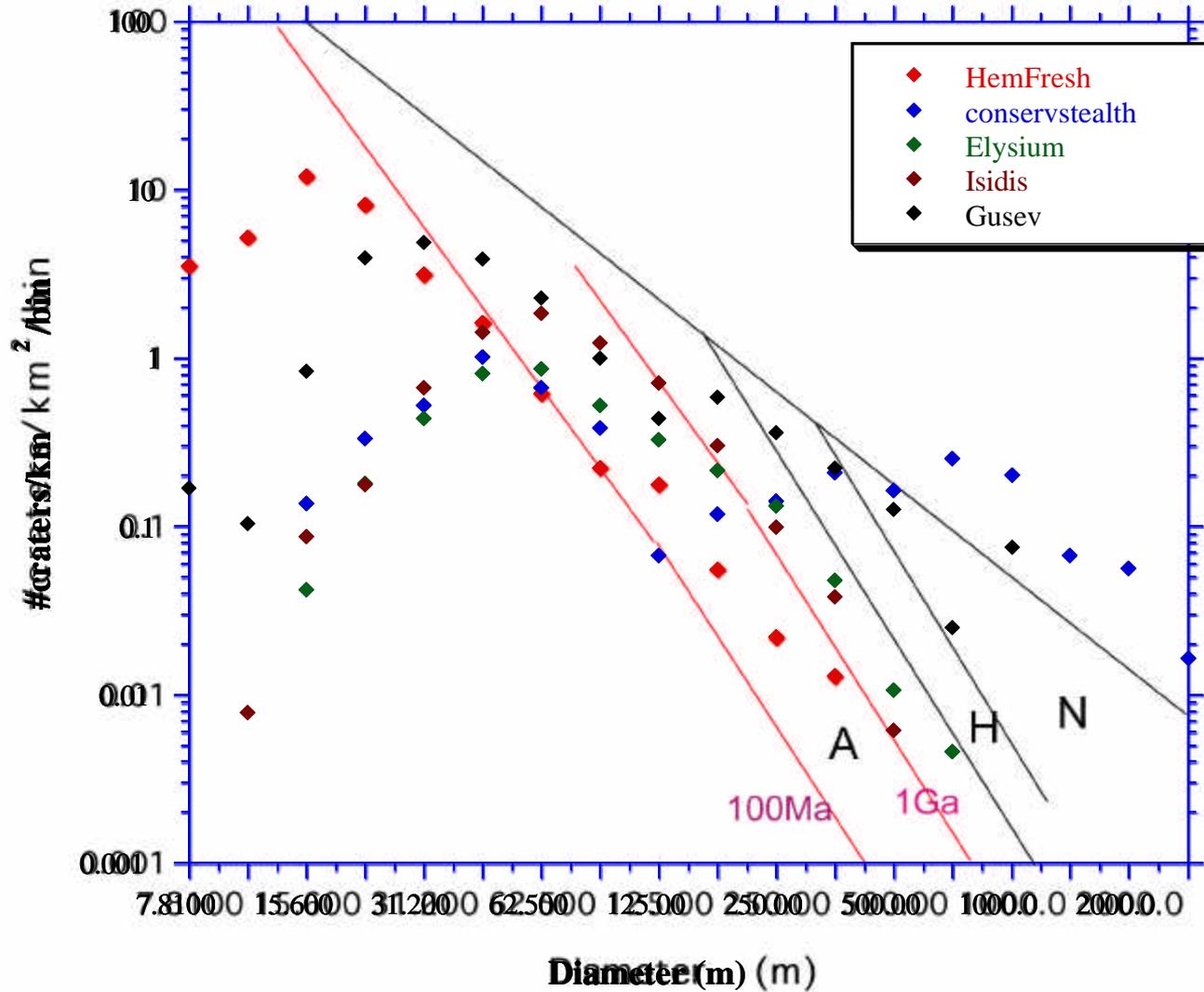
### Hematite Stealth Craters



# Hematite

- Amazonian hematite-bearing unit atop probable Noachian unit
- Both materials likely accessible to the rover throughout ellipse
- Both materials likely recognizable (albedo, spectrally, material strength) to the rover throughout ellipse.

# MER Ellipse Average Crater Counts



# Summary

- Oldest surfaces: Gusev (2 data points) and Hematite (Stealth)
- Potential of Noachian colluvium and alluvium in Elysium and Isidis as resurfacing agent, but surfaces generally LH/EA
- Good access to ridges in Elysium; possible mud volcanism as resurfacing agent.
- Youngest surfaces: Gusev bright and Hematite-rich
- Hematite best chance to access and recognize the two terrains of interest